Honors Geometry Chapter 1

Prerequisite knowledge:
- Exact means no rounding
- Remember to include units in your answer for problems involving units

1-1 Points, Lines, and Planes
- Name points, lines, planes.
- Identify collinear points and coplanar lines.
- Lines intersect in a point. Points intersect in a plane.

1-2 Linear Measure and Precision
- Find precision in metric units and customary units.
- Calculate measures using the "betweenness of points" property.
- Use correct notation: segments are congruent; distances are equal.

1-3 Distance and Midpoints
- Use the distance formula or Pythagorean Theorem to find distances.
- Find coordinates of midpoints or find coordinates of an endpoint given a midpoint.
- Use segment bisectors to find measures of line segments.

1-4 Angle Measure
- Classify angles.
- Use congruent angles and angle bisectors to find measures of angles.

1-5 Angle Relationships
- Identify and use special pairs of angles in algebraic equations and inequalities.
- Identify perpendicular lines.

1-6 Polygons
- Classify polygons by its number of sides and whether they are convex or concave and regular or irregular.
- Find perimeters of polygons.

1-1 Points, Lines, and Planes

Space: boundless, three dimensional set of all points

	Point	**Line**	**Plane**
Model			
Description	Location without _______or_______	Made up of ____________ extended infinitely; no ______________ or ________	Flat surface made up of __________ extended infinitely; no ___________________
Named by	a capital letter	a lower case script letter or the letters of 2 points on the line	a capital script letter or the letters naming 3 noncollinear pts
Examples			
Facts	• A point has ________ dimension.	• A line exists in 1 dimension. • Points on the same line are ____________________. • There is exactly one line through any ______ points.	• A plane exists in 2 dimensions. • Points on the same plane are _______________________. • There is exactly one plane through any _____ ___________________ points.
Nature			

Ex 1: Do these lines intersect? ______________

Ex 2: Two planes intersect in a _________________**.**

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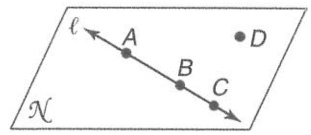
1-1 Study Guide and Intervention

Points, Lines, and Planes

Name Points, Lines, and Planes In geometry, a **point** is a location, a **line** contains points, and a **plane** is a flat surface that contains points and lines. If points are on the same line, they are **collinear**. If points on are the same plane, they are **coplanar**.

Example **Use the figure to name each of the following.**



a. a line containing point *A*

The line can be named as ℓ. Also, any two of the three points on the line can be used to name it.

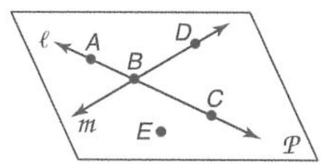
$\overleftrightarrow{AB}$, $\overleftrightarrow{AC}$, or $\overleftrightarrow{BC}$

b. a plane containing point *D*

The plane can be named as plane $\mathcal{N}$ or can be named using three noncollinear points in the plane, such as plane *ABD*, plane *ACD*, and so on.

Exercises

Refer to the figure.



1. Name a line that contains point *A*.

2. What is another name for line *m*?

3. Name a point not on $\overleftrightarrow{AC}$.

4. Name the intersection of $\overleftrightarrow{AC}$ and $\overleftrightarrow{DB}$.

5. Name a point not on line ℓ or line *m*.

Draw and label a plane *Q* for each relationship.

6. $\overleftrightarrow{AB}$ is in plane *Q*.

7. $\overleftrightarrow{ST}$ intersects $\overleftrightarrow{AB}$ at *P*.

8. Point *X* is collinear with points *A* and *P*.

9. Point *Y* is not collinear with points *T* and *P*.

10. Line ℓ contains points *X* and *Y*.

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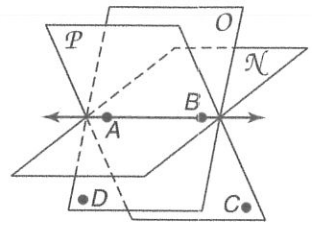
1-1 Study Guide and Intervention *(continued)*

Points, Lines, and Planes

Points, Lines, and Planes in Space **Space** is a boundless, three-dimensional set of all points. It contains lines and planes.

Example



a. How many planes appear in the figure?

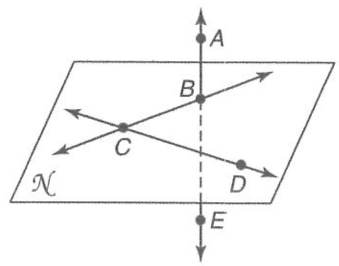
There are three planes: plane $\mathcal{N}$, plane O, and plane $\mathcal{P}$.

b. Are points A, B, and D coplanar?

Yes. They are contained in plane O.

Exercises

Refer to the figure.

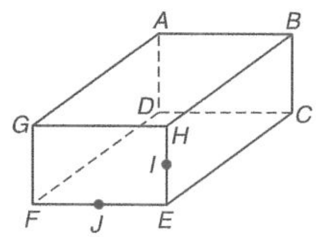


1. Name a line that is not contained in plane $\mathcal{N}$.

2. Name a plane that contains point B.

3. Name three collinear points.

Refer to the figure.



4. How many planes are shown in the figure?

5. Are points B, E, G, and H coplanar? Explain.

6. Name a point coplanar with D, C, and E.

6b. Where does plane FEC intersect plane GFB?

Draw and label a figure for each relationship. (Enrichment)

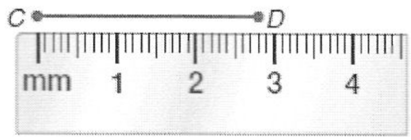
7. Planes $\mathcal{M}$ and $\mathcal{N}$ intersect in $\overleftrightarrow{HJ}$.

8. Line r is in plane $\mathcal{N}$, line s is in plane $\mathcal{M}$, and lines r and s intersect at point J.

9. Line t contains point H and line t does not lie in plane $\mathcal{M}$ or plane $\mathcal{N}$.

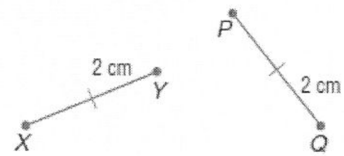
Lesson 1-1

1-2 Linear Measure and Precision



Notation for line segment:

Notation for length of a line segment:



Congruent Segments: two segments have the same ______________.

Notation for congruent segments:

Definition for congruent segments:

The ______________ of any measurement depends on the smallest unit available on the measuring tool.

The range of error in the measurement is called the _____________ and can be expressed as ________.

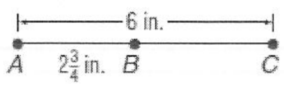
Examples: Find the precision for each measurement

1. 10 inches   2. 44 cm   3. 3.5 mm   4. $2\frac{1}{2}$ ft

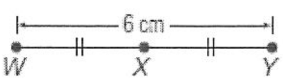
Betweenness of Points (Segment Addition Postulate): Point *M* is between points *P* and *Q* if and only if *P*, *Q*, and *M* are ___________________ and *PM* + *MQ* = _________.

1. Find the measurement of each segment. Assume the figures are not drawn to scale.

$\overline{BC}$



$\overline{WX}$

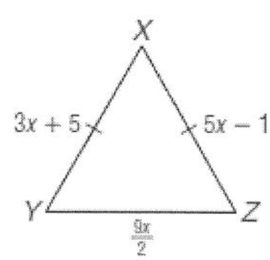


2. Find *x* and *RS* if *S* is between *R* and *T*.

$RS = 2x$, $ST = 5x + 4$, and $RT = 32$.

$RS = 4x$, $\overline{RS} \cong \overline{ST}$, and $RT = 24$.

3. Use the figure to determine whether $\overline{XY}$ is congruent to $\overline{YZ}$.



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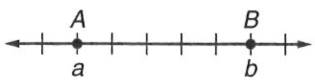
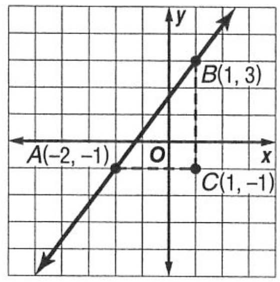
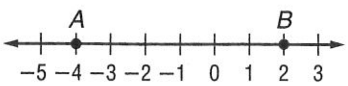
1-3 Study Guide and Intervention

Distance and Midpoints

Distance Between Two Points

Distance on a Number Line	Distance in the Coordinate Plane
 $AB = \|b - a\|$ or $\|a - b\|$	Pythagorean Theorem: $a^2 + b^2 = c^2$ Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ 

Example 1 **Find *AB*.**



$AB = |(-4) - 2|$
$= |-6|$
$= 6$

Example 2 **Find the distance between $A(-2, -1)$ and $B(1, 3)$.**

Pythagorean Theorem

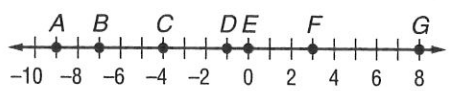
$(AB)^2 = (AC)^2 + (BC)^2$
$(AB)^2 = (3)^2 + (4)^2$
$(AB)^2 = 25$
$AB = \sqrt{25}$
$= 5$

Distance Formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$AB = \sqrt{(1 - (-2))^2 + (3 - (-1))^2}$
$AB = \sqrt{(3)^2 + (4)^2}$
$= \sqrt{25}$
$= 5$

Exercises

Use the number line to find each measure.



1. *BD* **2.** *DG*

3. *AF* **4.** *EF*

5. *BG* **6.** *AG*

7. *BE* **8.** *DE*

Use the Pythagorean Theorem to find the distance between each pair of points.

9. $A(0, 0)$, $B(6, 8)$ **10.** $R(-2, 3)$, $S(3, 15)$

11. $M(1, -2)$, $N(9, 13)$ **12.** $E(-12, 2)$, $F(-9, 6)$

Use the Distance Formula to find the distance between each pair of points.

13. $A(0, 0)$, $B(15, 20)$ **14.** $O(-12, 0)$, $P(-8, 3)$

15. $C(11, -12)$, $D(6, 2)$ **16.** $E(-2, 10)$, $F(-4, 3)$

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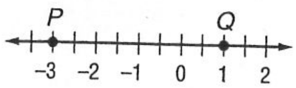
1-3 Study Guide and Intervention *(continued)*

Distance and Midpoints

Midpoint of a Segment

Midpoint on a Number Line	If the coordinates of the endpoints of a segment are a and b, then the coordinate of the midpoint of the segment is $\frac{a+b}{2}$.
Midpoint on a Coordinate Plane	If a segment has endpoints with coordinates (x_1, y_1) and (x_2, y_2), then the coordinates of the midpoint of the segment are $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$.
Segment Bisector	

Example 1 **Find the coordinate of the midpoint of $\overline{PQ}$.**



The coordinates of P and Q are −3 and 1.

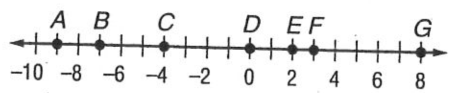
If M is the midpoint of $\overline{PQ}$, then the coordinate of M is $\frac{-3+1}{2} = \frac{-2}{2}$ or −1.

Example 2 **M is the midpoint of $\overline{PQ}$ for $P(-2, 4)$ and $Q(4, 1)$. Find the coordinates of M.**

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{-2+4}{2}, \frac{4+1}{2}\right) \text{ or } (1, 2.5)$$

Exercises

Use the number line to find the coordinate of the midpoint of each segment.



1. $\overline{CE}$

2. $\overline{DG}$

3. $\overline{AF}$

4. $\overline{EG}$

5. $\overline{AB}$

6. $\overline{BG}$

7. $\overline{BD}$

8. $\overline{DE}$

Find the coordinates of the midpoint of a segment having the given endpoints.

9. $A(0, 0)$, $B(12, 8)$

10. $R(-12, 8)$, $S(6, 12)$

11. $M(11, -2)$, $N(-9, 13)$

12. $E(-2, 6)$, $F(-9, 3)$

13. $S(10, -22)$, $T(9, 10)$

14. $M(-11, 2)$, $N(-19, 6)$

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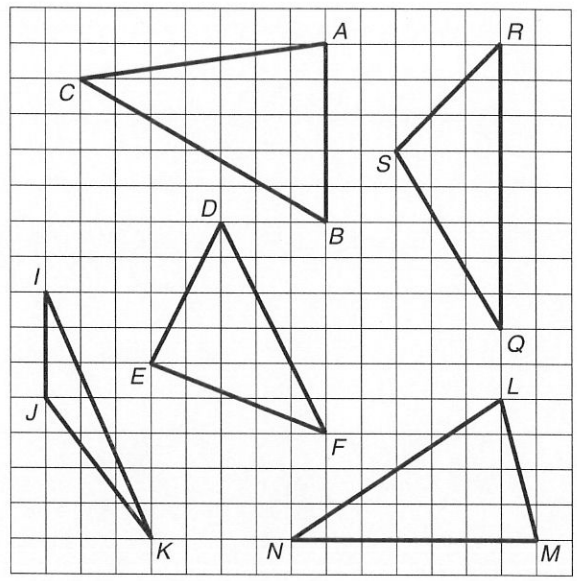
1-3 Enrichment

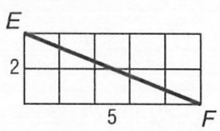
Lengths on a Grid

Evenly-spaced horizontal and vertical lines form a grid.

You can easily find segment lengths on a grid if the endpoints are grid-line intersections. For horizontal or vertical segments, simply count squares. For diagonal segments, use the Pythagorean Theorem (proven in Chapter 7). This theorem states that in any right triangle, if the length of the longest side (the side opposite the right angle) is c and the two shorter sides have lengths a and b, then $c^2 = a^2 + b^2$.



Example **Find the measure of $\overline{EF}$ on the grid at the right. Locate a right triangle with $\overline{EF}$ as its longest side.**



$EF = \sqrt{2^2 + 5^2} = \sqrt{29} \approx 5.4$ units

Find each measure to the nearest tenth of a unit.

1. $\overline{IJ}$ **2.** $\overline{MN}$ **3.** $\overline{RS}$ **4.** $\overline{QS}$

5. $\overline{IK}$ **6.** $\overline{JK}$ **7.** $\overline{LM}$ **8.** $\overline{LN}$

Use the grid above. Find the perimeter of each triangle to the nearest tenth of a unit. Find the exact length of each side, then round w/ a calculator.

9. $\triangle ABC$ **10.** $\triangle QRS$ **11.** $\triangle DEF$ **12.** $\triangle LMN$

13. Of all the segments shown on the grid, which is longest? What is its length?

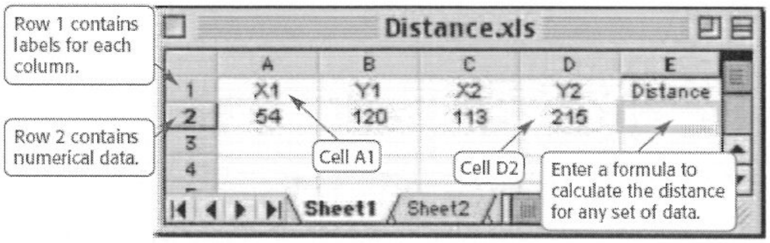
14. On the grid, 1 unit = 0.5 cm. How can the answers above be used to find the measures in centimeters?

15. Use your answer from exercise 8 to calculate the length of segment LN in centimeters. Check by measuring with a centimeter ruler.

16. Use a centimeter ruler to find the perimeter of triangle IJK to the nearest tenth of a centimeter.

1-3 Spreadsheet Activity **10 points**

Objective: Use Google Spreadsheets to quickly and accurately calculate distances between points.



Values are used in formulas by using a specific cell name. For example, 54 is represented by the cell name, A2. For calculations, use = and appropriate abbreviations. Ex: =SQRT(A2 - C2). To raise a number to a power, use a carrot (x^2 *is* x^2).

Using the table above, write an excel formula that could be used to calculate the distance between the two points (x_1, y_1) *and* (x_2, y_2).

Part I: In a spreadsheet, find the distance between each pair of points to the **nearest tenth.**

a. (54, 120), (113, 215)

b. (68, 153), (175, 336)

c. (421, 454, (502, 789)

d. (837, 980), (612, 625)

e. (1967, 3), (1998, 24)

f. (4173.5, 34.9), (2080.6, 22.4)

Part II: The coordinates of the vertices of a triangle are A(1,3), B(6, 10) and C(11, 18). In the same spreadsheet, write a formula for finding the perimeter of a triangle given three ordered pairs. Use your formula to answer the following questions in the excel spreadsheet. Round to the nearest tenth.

a. Find the perimeter of triangle ABC.
b. Suppose each coordinate is multiplied by 2. What is the perimeter of this triangle?
c. Find the perimeter of the triangle when the coordinates are multiplied by 3.
d. Make a conjecture about the perimeter of a triangle when the coordinates of its vertices are multiplied by the same positive factor.

When finished, save your spreadsheet as *"Last name" Spreadsheet Activity*

Then upload it in google classroom.

Rubric

Criteria	**Points earned**	**Points Possible**
Clear tables and correct formulas in part I		2
Round to the nearest tenth		1
Accurate distances in part I		2
Correct table of coordinates and use the distance formula in excel to calculate the perimeter.		2
Show the perimeter when it doubles and triples		2
Believable conjecture		1
Final Grade		10

1-4 Angle Measure

Introduction: Feel free to write any new information in notes.

*Need whiteboard, marker, eraser, and protractor.

1. Draw a ray.
2. Name your ray.
3. Write another name for your ray.
4. Draw opposite rays.
5. Draw an angle.
6. Name your angle.
7. Circle the vertex of your angle.
8. Name the sides of your angle.
9. Place point Q in the interior of the angle.
10. Place point R in the exterior of the angle.
11. Measure your angle.
12. Draw an acute angle.
13. Draw an obtuse angle.
14. Draw a right angle.
15. Draw a reflex angle.

Congruent Angles: angles that have the same measure.

Model: **Symbols:**

Angle Bisector: a ray (interior) that divides an angle into 2 congruent angles

Model: **Symbols:**

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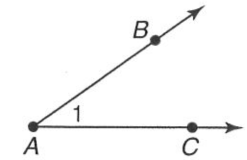
1-4 Study Guide and Intervention

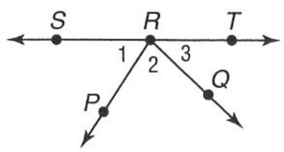
Angle Measure

Measure Angles If two noncollinear **rays** have a common endpoint, they form an **angle**. The rays are the **sides** of the angle. The common endpoint is the **vertex**. The angle at the right can be named as $\angle A$, $\angle BAC$, $\angle CAB$, or $\angle 1$.



A **right angle** is an angle whose measure is 90. An **acute angle** has measure less than 90. An **obtuse angle** has measure greater than 90 but less than 180.

Example 1



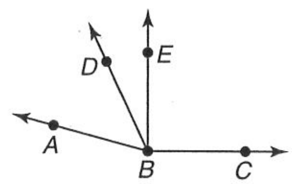
a. Name all angles that have *R* as a vertex.

Three angles are $\angle 1$, $\angle 2$, and $\angle 3$. For other angles, use three letters to name them: $\angle SRQ$, $\angle PRT$, and $\angle SRT$.

b. Name the sides of $\angle 1$.

$\overrightarrow{RS}$, $\overrightarrow{RP}$

Example 2 **Measure each angle and classify it as *right*, *acute*, or *obtuse*.**



a. $\angle ABD$

Using a protractor, $m\angle ABD = 50$.

$50 < 90$, so $\angle ABD$ is an acute angle.

b. $\angle DBC$

Using a protractor, $m\angle DBC = 115$.

$180 > 115 > 90$, so $\angle DBC$ is an obtuse angle.

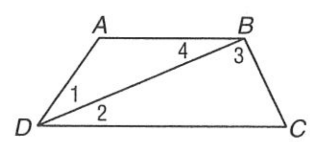
c. $\angle EBC$

Using a protractor, $m\angle EBC = 90$.

$\angle EBC$ is a right angle.

Exercises

Refer to the figure.

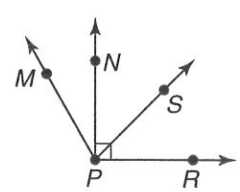


1. Name the vertex of $\angle 4$.

2. Name the sides of $\angle BDC$.

3. Write another name for $\angle DBC$.

Measure each angle in the figure and classify it as *right*, *acute*, or *obtuse*. (use protractor)



4. $\angle MPR$

5. $\angle RPN$

6. $\angle NPS$

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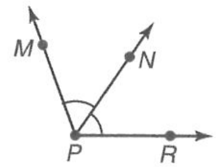
1-4 Study Guide and Intervention *(continued)*

Angle Measure

Congruent Angles Angles that have the same measure are **congruent angles**. A ray that divides an angle into two congruent angles is called an **angle bisector**. In the figure, $\overrightarrow{PN}$ is the angle bisector of $\angle MPR$. Point N lies in the interior of $\angle MPR$ and $\angle MPN \cong \angle NPR$.



Example **Refer to the figure above. If $m\angle MPN = 2x + 14$ and $m\angle NPR = x + 34$, find x and find $m\angle MPR$.**

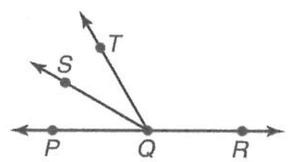
Since $\overrightarrow{PN}$ bisects $\angle MPR$, $\angle MPN \cong \angle NPR$, or $m\angle MPN = m\angle NPR$.

$$\begin{aligned} 2x + 14 &= x + 34 \\ 2x + 14 - x &= x + 34 - x \\ x + 14 &= 34 \\ x + 14 - 14 &= 34 - 14 \\ x &= 20 \end{aligned}$$

$$\begin{aligned} m\angle NPR &= (2x + 14) + (x + 34) \\ &= 54 + 54 \\ &= 108 \end{aligned}$$

Exercises

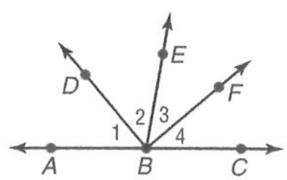
$\overrightarrow{QS}$ bisects $\angle PQT$, and $\overrightarrow{QP}$ and $\overrightarrow{QR}$ are opposite rays.



1. If $m\angle PQT = 60$ and $m\angle PQS = 4x + 14$, find the value of x.

2. If $m\angle PQS = 3x + 13$ and $m\angle SQT = 6x - 2$, find $m\angle PQT$.

$\overrightarrow{BA}$ and $\overrightarrow{BC}$ are opposite rays, $\overrightarrow{BF}$ bisects $\angle CBE$, and $\overrightarrow{BD}$ bisects $\angle ABE$.



3. If $m\angle EBF = 6x + 4$ and $m\angle CBF = 7x - 2$, find $m\angle EBC$.

4. If $m\angle 1 = 4x + 10$ and $m\angle 2 = 5x$, find $m\angle 2$.

5. If $m\angle 2 = 6y + 2$ and $m\angle 1 = 8y - 14$, find $m\angle ABE$.

6. Is $\angle DBF$ a right angle? Explain.

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1-4 Enrichment

Angle Relationships

Angles are measured in degrees (°). Each degree of an angle is divided into 60 minutes (′), and each minute of an angle is divided into 60 seconds (″).

$60' = 1^\circ$

$60'' = 1'$

$67\frac{1}{2}^\circ = 67^\circ30'$

$70.4^\circ = 70^\circ24'$

$90^\circ = 89^\circ60'$

Two angles are complementary if the sum of their measures is 90°. Find the complement of each of the following angles.

1. $35^\circ15'$

2. $27^\circ16'$

3. $15^\circ54'$

4. $29^\circ18'22''$

5. $34^\circ29'45''$

6. $87^\circ2'3''$

Two angles are supplementary if the sum of their measures is 180°. Find the supplement of each of the following angles.

7. $120^\circ18'$

8. $84^\circ12'$

9. $110^\circ2'$

10. $45^\circ16'24''$

11. $39^\circ21'54''$

12. $129^\circ18'36''$

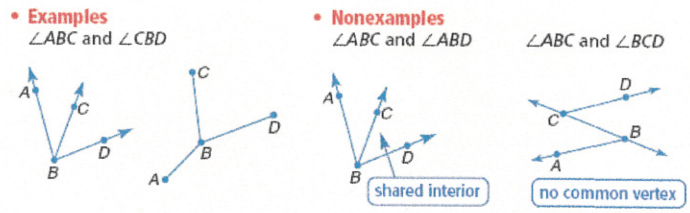
13. $98^\circ52'59''$

14. $9^\circ2'32''$

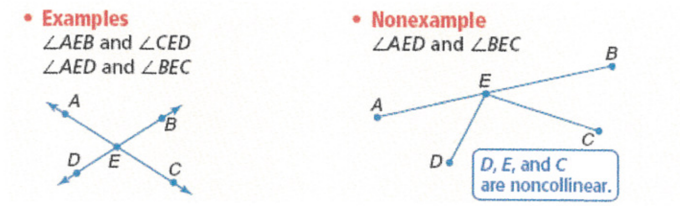
15. $1^\circ2'3''$

1-5 Angle Relationships

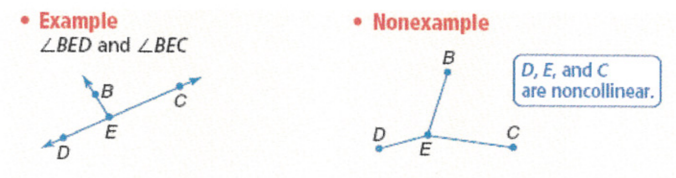
Adjacent Angles: two angles that lie in the same plane, have a common ________________, and a common_____________, but no common interior pts.



Vertical Angles: ________________ angles formed by ______ intersecting lines.

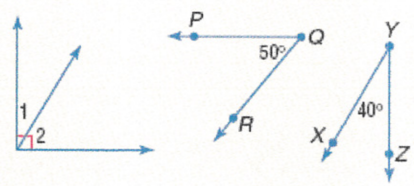


Linear Pair: pair of adjacent angles whose noncommon sides are _______________ rays.



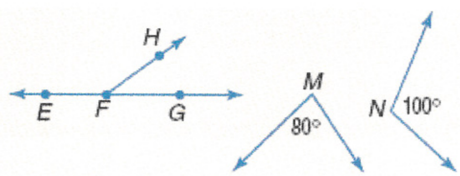
Complementary angles: two angles whose measures have a sum of__________.

• **Examples**
∠1 and ∠2 are complementary.
∠PQR and ∠XYZ are complementary.



Supplementary angles: two angles whose measures have a sum of ___________.

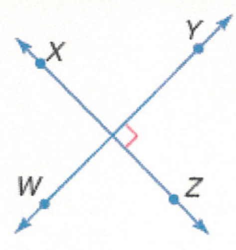
• **Examples**
∠EFH and ∠HFG are supplementary.
∠M and ∠N are supplementary.



Perpendicular Lines: lines that form _______________ angles.

Key Concept — **Perpendicular Lines**

- Perpendicular lines intersect to form four right angles.
- Perpendicular lines intersect to form congruent adjacent angles.
- Segments and rays can be perpendicular to lines or to other line segments and rays.
- The right angle symbol in the figure indicates that the lines are perpendicular.
- **Symbol** ⊥ is read *is perpendicular to.*



$\overleftrightarrow{XZ} \perp \overleftrightarrow{WY}$

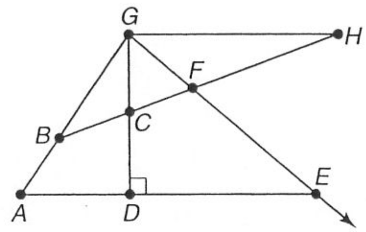
* Read bottom on page 40.

NAME ______________________ DATE __________ PERIOD _____

1-5 Practice

Angle Relationships

For Exercises 1–4, use the figure at the right and a protractor.



1. Name two obtuse vertical angles.

2. Name a linear pair whose vertex is B.

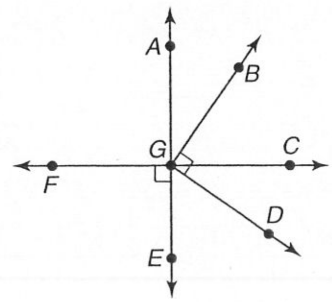
3. Name an angle not adjacent to but complementary to $\angle FGC$.

4. Name an angle adjacent and supplementary to $\angle DCB$.

5. Two angles are complementary. The measure of one angle is 21 more than twice the measure of the other angle. Find the measures of the angles.

6. If a supplement of an angle has a measure 78 less than the measure of the angle, what are the measures of the angles?

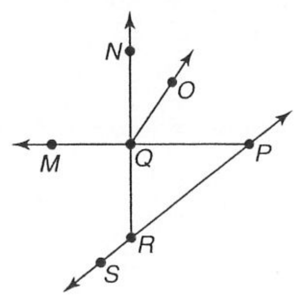
ALGEBRA For Exercises 7–8, use the figure at the right.



7. If $m\angle FGE = 5x + 10$, find x so that $\overleftrightarrow{FC} \perp \overleftrightarrow{AE}$.

8. If $m\angle BGC = 16x - 4$ and $m\angle CGD = 2x + 13$, find x so that $\angle BGD$ is a right angle.

Determine whether each statement can be assumed from the figure. Explain.

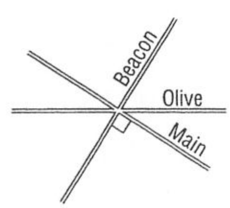


9. $\angle NQO$ and $\angle OQP$ are complementary.

10. $\angle SRQ$ and $\angle QRP$ is a linear pair.

11. $\angle MQN$ and $\angle MQR$ are vertical angles.

12. **STREET MAPS** Darren sketched a map of the cross streets nearest to his home for his friend Miguel. Describe two different angle relationships between the streets.

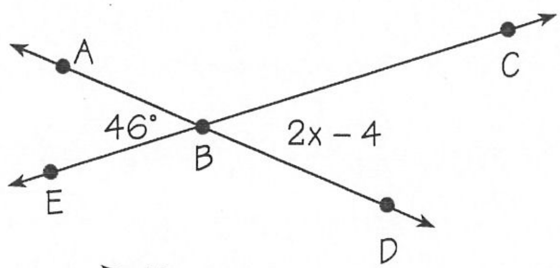


What is the playing surface called where the college basketball semi-finals are played?

Find the missing angle measures or variables. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

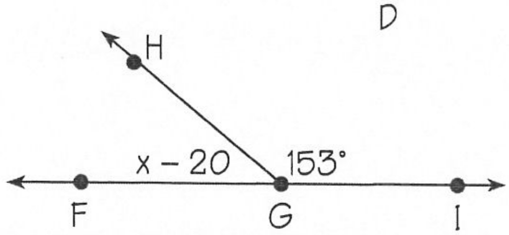
E: x = ______

O: m∠ABC = ______



F: x = ______

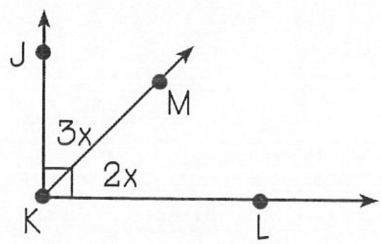
L: m∠FGH = ______



I: x = ______

R: m∠JKM = ______

N: m∠MKL = ______

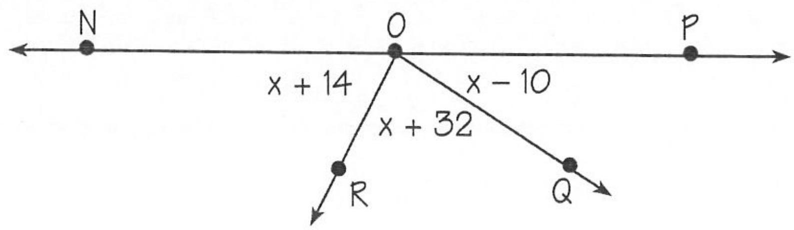


H: x = ______

O: m∠NOR = ______

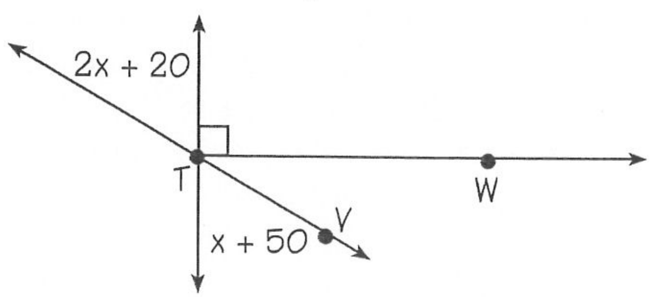
A: m∠ROQ = ______

F: m∠QOP = ______



T: x = ______

L: m∠VTW = ______



___	___	___	___	___	___	___	___	___	___	___	___	___	___	___
30	48	25	51	47	18	36	80	27	15	38	10	134	62	54

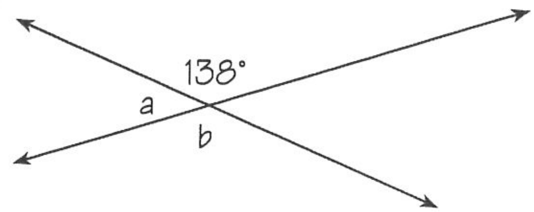
Segments, Angles, and Lines — Complementary, Supplementary, and Vertical Angles   Joke #4

What question do you ask a basketball player from Indiana?

Solve for the missing angle measures. To figure out the joke, place the letter of each problem above the answer on the line(s) below. Some blanks will go unfilled.

C: a = ______

O: b = ______

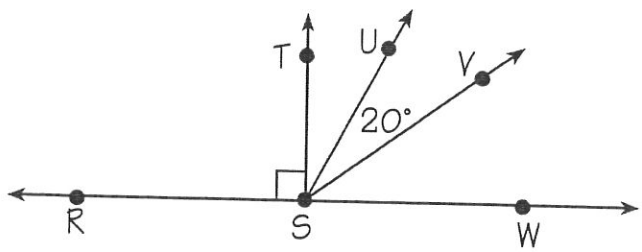


E: m∠TSW = ______

O: m∠TSU = ______

H: m∠USW = ______

A: m∠RSV = ______



∠TSU ≅ ∠VSW

R: c = ______

H: d = ______

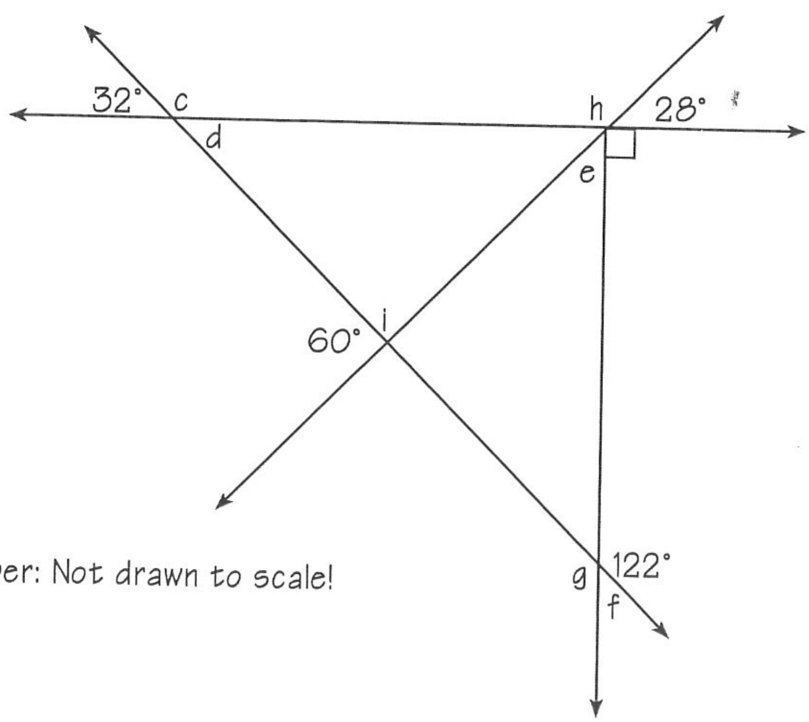
S: e = ______

O: f = ______

W: g = ______

C: h = ______

I: i = ______



Remember: Not drawn to scale!

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ?

122° 55° 58° 35° 62° 120° 90° 148° 71° 152° 138° 145° 42° 32°

1-6 Polygons

Polygon:

1) The sides that have a common endpoint are ____________________.

2) Each side intersects exactly ____ other sides, but only at their ______________.

Symbol:

Examples	**Nonexamples**

Convex	
Concave	

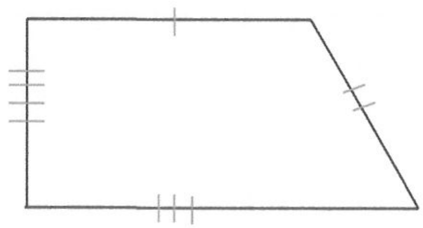
n-gon:

3	4	5	6	7	8	9	10	12

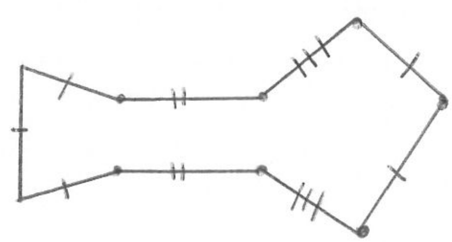
Regular Polygon-

Example 1: Name each polygon by the number of sides. Then classify it as convex or concave, regular or irregular.

A.



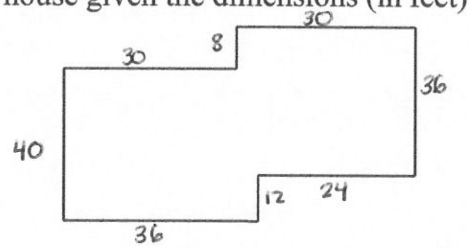
B.



Perimeter-

Triangle	Square	Rectangle

Example 2: A masonry company is contracted to lay three layers of decorative brick along the foundation for a new house given the dimensions (in feet) below.



a. Find the perimeter of the foundation and determine how many bricks the company will need to complete the job. Assume that one brick is 8 inches long

b. The builder realizes he accidentally halved the size of the foundation in part *a*, so he reworks the drawing with the correct dimension. How will this affect the perimeter of the house and the number of bricks the masonry company needs.

Example 3: Find the perimeter of Pentagon ABCDE with the following coordinates: A(0,4), B (4,0), C(3, -4), D (-3,-4), and E(-3,1).

Example 4: The width of a rectangle is 5 less than twice its length. The perimeter is 80 centimeters. Find the length of each side.